Introduction

In this section, the lessons focus on identifying place values, rounding decimals through hundredths, and writing and solving problems with decimals.

These lessons form an outline for your ARI classes, but you are expected to add other lessons as needed to address the concepts and provide practice of the skills introduced in the *ARI Curriculum Companion.*

MATERIALS SUMMARY

Deck of cards

Set of nine index cards, each with a numeral 1–9

Overhead, Elmo™, or LCD projector (optional)

Some of the lessons cross grade levels, as indicated by the SOL numbers shown below. This is one method to help students connect the content from grade to grade and to accelerate.

For the lessons in this section, you will need the materials listed at right.

Standards of Learning

The following Standards of Learning are addressed in this section:

5.1 The student will
- a) read, write, and identify the place values of decimals through thousandths;
- b) round decimal numbers to the nearest tenth or hundredth; and
- c) compare the values of two decimals through thousandths, using the symbols >, <, or =.

6.7 The student will use estimation strategies to solve multistep practical problems involving whole numbers, decimals, and fractions (rational numbers).

6.8 The student will solve multistep consumer-application problems involving fractions and decimals and present data and conclusions in paragraphs, tables, or graphs. Planning a budget will be included.

7.4 The student will
- a) solve practical problems using rational numbers (whole numbers, fractions, decimals) and percents.

8.3 The student will solve practical problems involving rational numbers, percents, ratios, and proportions. Problems will be of varying complexities and will involve real-life data, such as finding a discount and discount prices and balancing a checkbook.

Table of Contents

Lesson plans pertaining to the following Standards of Learning are found in this section. Click (or CTRL+click) on each to jump to that lesson.

* SOL 5.1

Prerequisite SOL

4.4

Lesson Summary

Students identify place values. (45 minutes)

Materials

Set of nine index cards, each with a numeral 1–9
Copies of the attached worksheet

Warm-up

1. Have each student draw four short lines on a sheet of paper with a comma between the first and second line (___ , ___ ___ ___); these represent the places of a 4-digit number. Tell students what these lines represent and that they are going to play a game with the object of creating the largest possible 4-digit number, using four numerals drawn from a set of cards. As you draw each numeral, students must decide on which of the four lines to write it—that is, where to place it in the 4-digit number. Once placed, the numeral may not be moved.
2. Shuffle the cards, draw one, announce the numeral, and display it for the students to see. Have students write the numeral on one of the four lines. When you draw the second card, remind them that they may not move the first numeral to a different place. Continue this procedure for a total of four digits.
3. Ask students for the numbers they created, display these on the board, and discuss which is the largest and why. Be sure to discuss how to arrange the four numerals into the largest possible 4-digit number and to discuss place values and strategy. Award one point to every student who created the largest number.
4. Play as many rounds of the game as needed to review sufficiently place values with whole numbers.

Lesson

1. Tell the class that they will now employ the same strategies they used in the warm-up, except they will be working with decimals.
2. Have each student draw four lines with a decimal point between the third and fourth line (___ ___ ___ . ___).
3. Have the students play the game as before, again having them decide what is the largest possible number using the four numerals drawn. Check the accuracy of their reading of the decimal number.
4. Continue playing as long as needed for students to practice identifying decimal place values. Ask questions relating to place values as you compare the numbers students created. For variety, have students create the smallest number possible, and/or move the decimal point so that they may practice with hundredths and thousandths.
5. Distribute the attached worksheet, “Who Won the Game?” to pairs of students, and have them complete it. When all pairs have completed the task, discuss the answer and clarify any questions. Note: For the last pair of numbers, you may need to show students that while 0 is in two different place-value columns, the value of the digit is *the same in both places* because zero ones has the same value as zero tens.

Reflection

Have students write a response to the question, “How do you know 34.16 is less than 34.27?”

Name: _____

Who Won the Game?

Jill and Kareem are playing a place value game. They each draw a card out of a bowl and compare.

For each pair of numbers selected, circle the number in which the underlined digit has the greatest value, as shown below in Play 1. Also circle the number of points earned for the person with the greatest value. In case of a tie, each person gets the points.

When finished, add up the circled points for each player and see who won the game!

Jill

Play	Number	Points
1	30.<u>2</u>4	22
2	9<u>6</u>7.4	41
3	<u>5</u>,743.19	25
4	5<u>2</u>7.18	36
5	2<u>8</u>7.0	27
6	6<u>5</u>2.09	36
7	4<u>6</u>1.2	55
8	1<u>3</u>.62	27
9	6.<u>5</u>2	27
10	237.<u>1</u>5	22
11	9,<u>8</u>15.0	51
12	4.7<u>2</u>	25
13	5.<u>7</u>	36
14	7.3<u>1</u>	37
15	1,67<u>0</u>.14	36
	TOTAL	_____

Kareem

Play	Number	Points
1	<u>3</u>2.04	35
2	<u>6</u>49.2	45
3	4,7<u>5</u>2.31	16
4	3<u>2</u>.57	29
5	7,<u>8</u>12.4	25
6	6<u>5</u>.29	29
7	1.<u>6</u>2	47
8	1.<u>3</u>2	21
9	7<u>5</u>6.2	42
10	50<u>1</u>.16	37
11	241.<u>8</u>9	35
12	467.<u>2</u>9	45
13	6.5<u>7</u>	29
14	2.<u>1</u>7	25
15	4,60<u>1</u>.79	21
	TOTAL	_____

* SOL 5.1

Prerequisite SOL

4.4

Lesson Summary

Students round decimals through hundredths. (45 minutes)

Materials

Set of nine index cards, each with a numeral 1–9

Warm-up

1. Have each student draw four short lines on a sheet of paper with a decimal point between the second and third line (___ ___ . ___ ___); these represent the places of a 4-digit number. Tell students what these lines represent and that they are going to play a game with the object of creating the largest possible 4-digit number, using four numerals drawn from a set of cards. As you draw each numeral, students must decide on which of the four lines to write it—that is, where to place it in the 4-digit number. Once placed, the numeral may not be moved.
2. Shuffle the cards, draw one, announce the numeral, and display it for the students to see. Have students write the numeral on one of the four lines. When you draw the second card, remind them that they may not move the first numeral to a different place. Continue this procedure for a total of four digits.
3. Ask students for the numbers they created, display these on the board, and discuss which is the largest and why. Be sure to discuss how to arrange the four numerals into the largest possible 4-digit number and to discuss place values and strategy. Award one point to every student who created the largest number.
4. Play as many rounds of the game as needed to review sufficiently place values with whole numbers. For variety, change the object of the game to creating the smallest number, and/or move the location of the decimal point.

Lesson

1. Have the students continue playing the game from the warm-up, but add a new twist—the winner is the person who creates the largest possible number *when it is rounded.* Play a practice round with a 4-digit whole number, using the lines ___ , ___ ___ ___ . After all four digits have been placed, have the students round their number to the nearest hundred. Then ask who thinks he/she has the largest number. As students offer both their original numbers and their rounded numbers, write the numbers on the board. After deciding on the largest rounded number, lead a discussion about the strategies used for rounding. Use this discussion to help the students who need a review of how to round.
2. Have each student draw four new lines with a decimal point between the second and third line (___ ___ . ___ ___).
3. Have student continue playing the game, rounding their numbers to the nearest tenth. Have a brief discussion after each play to reinforce rounding procedures. For variety, move the location of the decimal point so that students round to the nearest hundredth.

Reflection

Have students write a response to question, “How do you round 45.64 to the nearest tenth?”

✱ SOL 6.7, 6.8, 7.4a, 8.3

Prerequisite SOL

5.4, 5.5, 6.4

Lesson Summary

Students solve problems involving decimals, verbalize their strategies, and write problems. (periodically over the course of several days)

Materials

Overhead, Elmo™, or LCD projector (optional)

Background

In the "Exploring Whole Numbers" section of this *ARI Curriculum Companion*, there are several lessons that focus on solving problems by identifying strategies. Those lessons can and should be repeated here, substituting problems that include decimals, because they focus student attention on how to deal with a word problem.

See the streaming video clip on "Multi-Step Problem Solving," located in the set of video clips for middle school mathematics found on the DOE Web site at http://www.doe.virginia.gov/VDOE/middle-math-strategies/.

Warm-up

1. Display the following problem with a projector, or write it on the board:

   > Cody was paid $15.00 for washing his mother's car. He spent $5.75 on a movie, $1.50 on candy, and $2.00 for a soda. Now he wants to buy a CD on sale for $7.99. How much more money does he need?

2. Walk the class through the problem, step-by-step. Explain that this is a "multi-step problem," which means you need to perform several operations in sequence to arrive at the answer. Have the students identify the steps, both in the solution and in the wording of the problem itself, that make this a multi-step problem.
3. If necessary, have students solve another similar multi-step problem involving decimals.

Lesson

1. Have students work in pairs to create a multi-step word problem involving decimals and to write the multi-step solution. Have each pair prepare to present their problem visually to the class, using either a projector or the board.
2. Have each pair present their problem visually to the class. Be sure they allow enough time for the class to solve the problem.
3. Have each pair explain the multi-step solution to the class.

Consider having one or two student presentations per class period over the next several classes, or devote one or two classes to this student-led method of solving multi-step word problems involving decimals.

Reflection

At the end of each class containing one or more of the above student presentations, hold a class discussion on problem-solving tips or strategies that were learned from the presentations.